

**IN THE CLAIMS:**

- 1 1. (Currently Amended) ~~An extensible, system-independent, version-interoperable for-~~  
2 ~~mat for transmitting a data stream having data set information from a source system to a~~  
3 ~~replica residing on a destination system comprising:~~ A system for transmitting a data  
4 stream having data set information, the system comprising:  
5 a destination system having a replica residing therein;  
6 a source system having a replication agent executing thereon, the replication agent  
7 adapted to generate the data stream, the data stream comprising of:  
8 a plurality of standalone headers having discrete identifiers, each of the  
9 plurality of standalone headers being representative of a plurality of data stream charac-  
10 teristics; and  
11 a data following header that follows, in the data stream, the plurality of  
12 standalone headers and that indicates that the data set information is following the data  
13 following header, the data set header including an extended attribute field that associates  
14 an extended attribute with the data set information.
- 1 2. (Currently Amended) The system format as set forth in claim 1 wherein the plu-  
2 rality of standalone headers each include an indication of one of a plurality of specialized  
3 header types and at least some of the plurality of specialized header types are adapted for  
4 carrying directory inode data.
- 1 3. (Currently Amended) The system format as set forth in claim 3 wherein the data  
2 stream is adapted to carry source file system inode data and source file generation num-  
3 bers.
- 1 4. (Currently Amended) The system format as set forth in claim 2 wherein one of  
2 the specialized header types comprises a deleted files type and the directory inode data  
3 comprises a list of deleted files on the source file system..

1 5. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein the ex-  
2 tended attributes include ACLs and streams associated with a plurality of operating sys-  
3 tems and system architectures.

1 6. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein one of  
2 the plurality of standalone headers comprises an open file/undo header that instructs the  
3 destination system to revert to an earlier copy of a stored file identified by the open  
4 file/undo header.

1 7. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein the data  
2 set information comprises file information.

1 8. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein the data  
2 set information comprises changed files on the source system transmitted for backup on  
3 the replica of the destination system.

1 9. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein the data  
2 following header includes offset and block number information with respect to the data  
3 set information that follows the data following header.

1 10. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein data fol-  
2 lowing header comprises a fixed-length record including (a) a generic part for storing an  
3 indication of a data following header type; (b) a non-generic part, adapted to carry prede-  
4 termined data related to the extended attribute and data related to offsets and block num-  
5 bers for the data set information that follows the data following header; and (c) a space  
6 for a bit-code representative of a name associated with the extended attribute.

1 11. (Currently Amended) The system format as set forth in claim 1 wherein each of  
2 the plurality of standalone headers comprises a fixed-length record including a generic  
3 part for storing an indication of one of a plurality of specialized header types, a non-  
4 generic part, adapted to carry predetermined data related one of the specialized header  
5 types and a space for additional information.

1 12. (Currently Amended) The system format as set forth in claim 1 wherein the data  
2 following header is adapted to be positioned within the data stream at predetermined in-  
3 tervals that are up to approximately 2 MB of data set information in size.

1 13. (Currently Amended) The system format as set forth in claim 1 wherein the desti-  
2 nation system is adapted to receive the data following header with the extended attribute  
3 and cause the data set information associated with the extended attribute to be stored an  
4 entry in a hidden permanent metadirectory with identifiers that are the same as identifiers  
5 for the data set information in a file system of the destination system, the entry having the  
6 extended attribute associated therewith so that retrieval of the entry from the hidden per-  
7 manent metadirectory also retrieves the extended attribute.

1 14. (Currently Amended) The system format as set forth in claim 13 wherein the des-  
2 tination system also includes a hidden purgatory metadirectory in which current data set  
3 information from the hidden permanent directory is stored during an update of the hidden  
4 permanent metadirectory with changed data set information, the destination system being  
5 further adapted to (a) delete the hidden purgatory metadirectory after a complete receipt  
6 of all expected changed data set information of the hidden permanent metadirectory with  
7 the changed data set information, and (b) move current data set information stored on the  
8 hidden purgatory directory back to the hidden permanent metadirectory after an incom-  
9 plete receipt of all expected changed data set information.

1 15. (Currently Amended) The system ~~format~~ as set forth in claim 14 wherein the des-  
2 tination system is adapted to create hidden new metadirectory to store changed data set  
3 information for transfer to the hidden permanent directory after of the complete receipt of  
4 all the expected changed data set information.

1 16. (Currently Amended) The system ~~format~~ as set forth in claim 1 wherein the  
2 source system and the destination system are remote with respect to each other and inter-  
3 connected by a network, and wherein the data stream is encapsulated within a networking  
4 protocol adapted for transmission over the network.

1 17. (Currently Amended) ~~A format for transmitting a data stream that includes data~~  
2 ~~set information between a source system and a replica stored on the destination system~~  
3 ~~comprising:~~ A system for transmitting a data stream that includes data set information,  
4 the system comprising:  
5 a destination system having a replica stored thereon;  
6 a source system having a replication agent executing thereon, the replication agent  
7 adapted to generate the data stream, the data stream comprising of a data following  
8 header appended to a predetermined-sized chunk of data, the data following header in-  
9 cluding a field that identifies extended attributes associated with data set information car-  
10 ried in the chunk.

1 18. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the ex-  
2 tended attributes include ACLs and streams associated with a plurality of operating sys-  
3 tems and system architectures.

1 19. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the data  
2 set information comprises file information.

1 20. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the data  
2 set information comprises changed files on the source system transmitted for backup on  
3 the replica of the destination system.

1 21. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the data  
2 following header includes offset and block number information with respect to the data  
3 set information that follows the data following header.

1 22. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein data  
2 following header comprises a fixed-length record including (a) a generic part for storing  
3 an indication of a data following header type; (b) a non-generic part, adapted to carry  
4 predetermined data related to the extended attribute and data related to offsets and block  
5 numbers for the data set information that follows the data following header; and (c) a  
6 space for a bit-code representative of a name associated with the extended attribute.

1 23. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the  
2 chunk has a size of up to approximately 2 MB of data set information.

1 24. (Currently Amended) The system ~~format~~ as set forth in claim 17 wherein the des-  
2 tination system is adapted to receive the data following header with the extended attribute  
3 and cause the data set information associated with the extended attribute to be stored an  
4 entry in a hidden permanent metadirectory with identifiers that are the same as identifiers  
5 for the data set information in a file system of the destination system, the entry having the  
6 extended attribute associated therewith so that retrieval of the entry from the hidden per-  
7 manent metadirectory also retrieves the extended attribute.

1 25. (Currently Amended) The system ~~format~~ as set forth in claim 24 wherein the des-  
2 tination system also includes a hidden purgatory metadirectory in which current data set  
3 information from the hidden permanent directory is stored during an update of the hidden

4 permanent metadirectory with changed data set information, the destination system being  
5 further adapted to (a) delete the hidden purgatory metadirectory after a complete receipt  
6 of all expected changed data set information of the hidden permanent metadirectory with  
7 the changed data set information, and (b) move current data set information stored on the  
8 hidden purgatory directory back to the hidden permanent metadirectory after an incom-  
9 plete receipt of all expected changed data set information.

1 26. (Currently Amended) The system ~~format~~ as set forth in claim 25 wherein the des-  
2 tination system is adapted to create hidden new metadirectory to store changed data set  
3 information for transfer to the hidden permanent directory after of the complete receipt of  
4 all the expected changed data set information.

1 27. (Original) A method for storing and retrieving extended attributes associated with a  
2 data set information comprising:  
3 storing a current data set information with current extended attributes in a perma-  
4 nent hidden metadirectory;  
5 transferring the data set information to a purgatory metadirectory upon receipt of  
6 a changed data set information;  
7 storing the received changed data set information in a new metadirectory; and  
8 upon completion of receipt of all expected changed data set information, transfer-  
9 ring the received changed data set information from the new metadirectory to the perma-  
10 nent metadirectory, the permanent metadirectory thereby being available for retrieval of  
11 extended attributes associated with the data set information.

1 28. (Original) The method as set forth in claim 27 further comprising the step of, upon a  
2 failure to complete receipt of all expected changed data set information, transferring the  
3 current data set information with the current extended attributes back to the permanent  
4 metadirectory.

1 29. (Original) The method as set forth in claim 28 wherein the data set information com-  
2 prises files organized in a directory tree structure the same as a file system structure on  
3 the destination system and wherein the extended attributes comprise ACLs and streams  
4 associated with the files.

1 30. (Original) The method as set forth in claim 29 further comprising the step of deleting  
2 the purgatory metadirectory after one of, either (a) the transferring of the changed data set  
3 information from the new metadirectory to the permanent metadirectory or (b) the trans-  
4 ferring of the current data set information from the purgatory metadirectory back to the  
5 permanent metadirectory.

1 31. (Original) The method as set forth in claim 30 further comprising, upon a request  
2 from the source to restore data sets from the data set information, scanning the permanent  
3 directory and retrieving the data sets including retrieving respective of the extended at-  
4 tributes associated with the data sets.

1 32. (Original) The method as set forth in claim 31 further comprising the step of provid-  
2 ing the retrieved data sets' extended attributes in a format for transmission to the source  
3 from the destination, the format including data following headers each having a field that  
4 associates the respective of the extended attributes with the retrieved data sets.

1 33. (Original) The method as set forth in claim 32 wherein the respective of the extended  
2 attributes are associated with the data sets based upon NT streams.

1 34. (Original) The method as set forth in claim 27 wherein the extended attributes are  
2 associated with the data set information in the permanent metadirectory using NT  
3 streams.

1 35. (Original) The method as set forth in claim 27 further comprising the step of provid-  
2 ing the data sets' extended attributes in a format for transmission to the destination from  
3 the source, the format including data following headers each having a field that associates  
4 the respective of the extended attributes with the retrieved data sets.

1 36. (Original) A method for ensuring coherency in a data set transmitted from a source  
2 system to a replica on a destination system comprising the steps of:  
3       retrieving a first modification time on the source system for the data set;  
4       opening the data set on the source system and transmitting the data set from the  
5 source system to the destination;  
6       after completing transmitting, closing the data set on the source system and re-  
7 trieving second modification time on the source system; and  
8       if the second modification time and the first modification time are not the same,  
9 providing by the source system an instruction to the destination system to revert to an  
10 earlier stored copy of the data set on the replica.

1 37. (Original) The method as set forth in claim 36 wherein the step of providing the in-  
2 struction comprises transmitting an undo standalone header in a data stream that includes  
3 the data set, the standalone header identifying the data set and indicating an undo header  
4 type.

1 38. (New) A computer readable medium for storing and retrieving extended attributes  
2 associated with a data set information, the computer readable medium including program  
3 instructions for performing the steps of::  
4 storing a current data set information with current extended attributes in a perma-  
5 nent hidden metadirectory;  
6 transferring the data set information to a purgatory metadirectory upon receipt of  
7 a changed data set information;  
8 storing the received changed data set information in a new metadirectory; and



9       upon completion of receipt of all expected changed data set information, transfer-  
10 ring the received changed data set information from the new metadirectory to the perma-  
11 nent metadirectory, the permanent metadirectory thereby being available for retrieval of  
12 extended attributes associated with the data set information.

1   39. (New) A computer readable medium for ensuring coherency in a data set transmitted  
2 from a source system to a replica on a destination system, the computer readable medium  
3 including program instructions for performing the steps of:  
4       retrieving a first modification time on the source system for the data set;  
5       opening the data set on the source system and transmitting the data set from the  
6 source system to the destination;  
7       after completing transmitting, closing the data set on the source system and re-  
8 trieving second modification time on the source system; and  
9       if the second modification time and the first modification time are not the same,  
10 providing by the source system an instruction to the destination system to revert to an  
11 earlier stored copy of the data set on the replica.